

## Prevention of liquefaction failure of saturated sands using biogas

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### Summary

Induced Partial Saturation (IPS) aims to increase liquefaction resistance by generating gas in the pores of fully saturated sands. An attempt to develop a more effective biogas desaturation method was made in this study. Nitrogen gas which was produced by denitrification process of *Pseudomonas stutzeri* was selected for the desaturation of saturated sand. First, researches on denitrification condition and efficiency were made. The optimum nitrogen source and the suitable range of temperature and pH were determined. Compared with the existing method using biogas, this bacteria has advantages including fast average rate of generating gas, short initial stagnation period and simple culture. Then, saturated and partially saturated sand samples were prepared and series of shaking table simulation tests were performed to explore the effect of seismic response using this method. The results show that liquefaction occurred for saturated samples under acceleration amplitude being  $2\text{m/s}^2$ . However, liquefaction did not occur for samples desaturated by biogas under the same input accelerations. The excess pore pressure decreases obviously with the decrease of degree of saturation. The volumetric strains of the samples decreased with the decrease of average pore pressure ratio, and there was a linear relationship between them. Acceleration amplification coefficients decreased with the decrease in degree of saturation. Thus the method is effective in reducing the liquefaction potential of sands.